

Bill Pasco, Process Engineer at Garmin AT in Salem, Oregon USA, was convinced from his decade-long experience that a data acquisition profiler was a data acquisition profiler. The well-known brands all have similar accuracies, which are limited by the accuracy of the thermocouples used for profiling. What Bill was interested in, however, was identifying which prediction software (process optimization software) could quickly and accurately determine how to set up his oven for an in-spec profile. This particular Garmin division is involved with avionics. Although it is exempt from RoHS, the unavailability of certain eutectic components is slowly forcing the division to go lead-free. That means a more challenging process due to the higher temperatures and tighter process window. Therefore, prediction becomes important for oven setup.



*Bill Pasco, Garmin AT
"I am not buying a thermal profiler —
I am buying prediction capabilities."*

Bill recently put the top three profiler companies' feet to the fire. He developed a design of experiment that identified two ideal temperature profiles for his test board — one low-temperature profile representing the standard eutectic solder, and one higher-temperature profile for dealing with difficult lead-free plated parts. By the time Bill invited the three companies for a profiler demonstration, he had the advantage of knowing which oven recipe would yield which thermal profile in his 10-zone reflow oven.

For step 1, each company ran a profile using the lower temperature oven recipe. In step 2, Bill entered the higher temperature oven recipe into each company's respective prediction software and studied the results that each system output. The KIC Explorer's Navigator software often predicted the profile within a few 1/10th's of a degree in peak temperature. The results were consistent and repeatable, two assemblies with probes at 5 locations were tested and analyzed. The two other profilers predicted within 5° – 15°C below the peak temperature.

"We really looked at the data for each brand and even eliminated some outliers but, still, other brands did not come close to the correct solution," Bill explained.

OK, so one prediction software nails it while the others are far off. So what? What value does the accurate prediction software offer a company manufacturing lead-free electronics? To answer that, we first have to look at the complexity of the lead free-application. Going forward dozens of recipes will need to be created for Garmin's reflow oven. Identifying a suitable recipe for each of their applications is important, but it may take a very long time when using old fashioned "trial and error" methods. This means a significant number of hours of production downtime that should have been spent running production instead. There are few things more expensive in a production facility than production downtime.

In addition to using an accurate prediction software to achieve fast oven set up, Bill attempts to identify one or two oven recipes that can produce all his various products in spec. This will eliminate or significantly reduce oven changeover time. An oven may require more than half an hour to stabilize on a new recipe, especially when going from a warmer to a cooler recipe. That again will result in unnecessary production downtime. Again, an accurate prediction software will identify the correct recipe.

Now we see why Garmin requires accurate prediction — and how KIC Explorer's Navigator software provides it.

"I don't know what KIC does differently, how their prediction works, but it is obvious that what they do is very different from everyone else," concluded Bill.